Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**

Monthly Safety and Health Snapshot

for the Western Australian minerals sector

Electrical hazards

Issued February 2018

Personal contact with electrical energy can result in death or injury by electric shock, arc flash, fire or explosion, arc blast or flying debris. It is important to understand safe work procedures when around electricity and ensure a licensed electrician conducts all electrical work.

This snapshot covers the period from 1 November 2016 to 31 October 2017 when there were 1,178 injuries and 2,371 notifiable incidents (specific reporting categories). Of these, 7 injuries and 394 notifiable incidents involved electricity.

@DMIRS_WA

Department of Mines, Industry Regulation and Safety

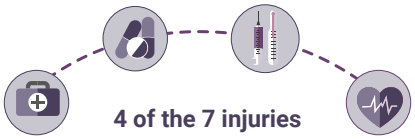
Notifiable incidents by area

91% of the notifiable incidents occurred during **surface operations**

9% of the notifiable incidents occurred during **underground operations**

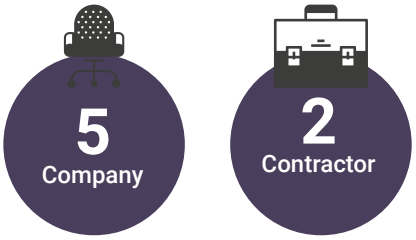
n = 394

Injuries by severity



4 of the 7 injuries identified as electrical injuries were **classified as serious**

Injuries by employment type



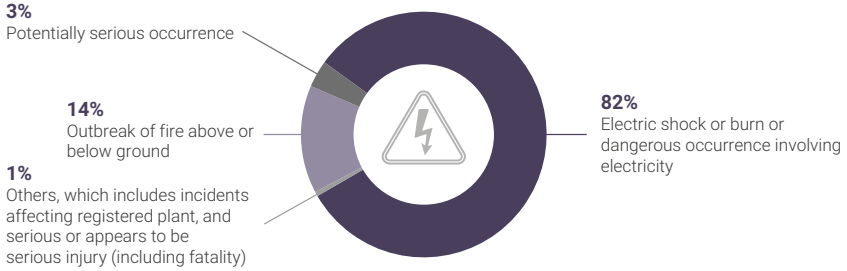
Notifiable incidents by incident type

61% of the notifiable incidents related to electricity were shock

37% were dangerous occurrences

2% were arc flash and burn

Notifiable incidents by reporting category

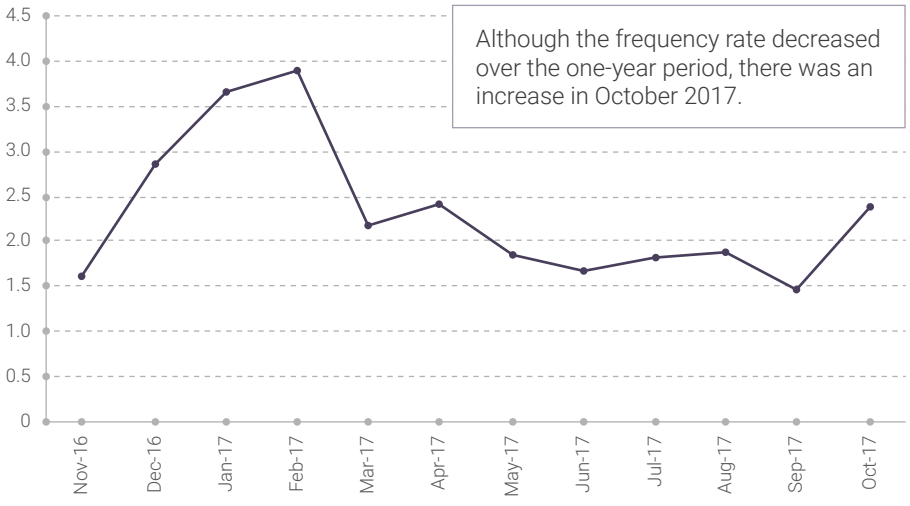


Injuries by part of body

All of the 7 injuries were to **hand (including wrist)**

1 electrical incident also caused an injury to the **face**

Notifiable incidents frequency rate (per million hours worked)



Although the frequency rate decreased over the one-year period, there was an increase in October 2017.

Note: The information in this snapshot has come from a keyword search of incident reports.

Some recent incidents

Electric shock 31/10/17

A boilermaker was welding inside the chute of a vessel at a processing plant. While changing out the electrodes, he received an electric shock. It was humid and wet inside the chute and the operator was sweating heavily, causing his gloves to become wet inside and out.

Electrical fire 20/10/17

During normal operations in an open pit, a fire was found in the engine bay of an excavator. The operator manually activated the aqueous film-forming foam fire suppression system, pressed the emergency stop button and, after confirming the fire was out, isolated the machine. Worn wiring insulation, rubbing against a steel panel in a concealed location in the engine bay, caused the electrical fire.

Spotlight on *Mines Safety Bulletin No. 138*

Electrical arc flash hazards in mining

7 December 2016

An arc flash is the uncontrolled release of energy caused by an electric arc, the temperature can be as much as four times that of the sun's surface.

Mines Safety Significant Incident Report No. 191

Mines Safety Significant Incident Report No. 192

Mines Safety Significant Incident Report No. 239

Contributory factors

Arc flash injuries usually arise when work is being conducted close to energised equipment without effective controls. For example:

- workers not wearing appropriate and adequate personal protective equipment (PPE)
- electrical equipment and cables not tested for insulation resistance prior to energising
- risk assessment not undertaken for a change in the isolation process
- work performed outside of the safe work instruction or procedure
- switchgear not subject to an adequate maintenance, test and repair program
- electrical drawings not updated to reflect changes to the electrical installation
- protection settings not calculated and set correctly.

The potential for arc flash should be minimised by using the hierarchy of control as a guide (i.e. elimination, substitution, isolation, engineering, administration, PPE). Use appropriate design and installation, supervision and training and work practices to reduce the risk of harm to workers.

Note: It is a regulatory requirement that electrical occurrences on mining operations are investigated by the electrical supervisor.

Impact of electrical shock on the body

Our nervous systems function by using electric current – an electric shock can overwhelm the system.

Severity of the injury is determined by:

- the level of current and the pathway through the body
- duration of contact with the current
- other factors such as skin wetness, gender (e.g. rate of perspiration, skin condition) and frequency of electric current (hertz)

Electric shocks can cause:

- muscles to grip relentlessly, making it impossible to let go of the faulty equipment
- a disruption in the heart's normal rhythm so blood no longer pumps properly and organs and muscles don't get the oxygen they need, resulting in permanent damage
- tensing of the diaphragm, and breathing stops
- burning of body parts along the current pathway

Safe work practices

Examples include:

- Isolate, tag and test electrical equipment before commencing work
- Always use residual current device protection with handheld tools and extension leads
- Medical assessment of anyone who has received an electric shock

More information

Electricity – mine safety matters pamphlet